lin and Brussels; the Societies at Ulm and Bath; the Geographical Society and Meteorological Office; and Nature; the Mass. Hist. Soc.; Silliman's Journal; Penna. Historical Society; Penn Monthly; Librarian of Congress; Kentucky Geological Survey; Mexican Geographical Society; Professor R. S. McCulloch and Mr. Samuel Davenport, of New Holland.

A circular letter from Dr. Aug. Le Jolis, dated Cherbourg, Oct. 12, respecting the 25th Anniversary (Dec. 30), of the Society of Science, was on motion referred to the Secretaries to be suitably answered, after being signed by the President.

A communication, entitled "On the Atmosphere of the Sun and Planets, by David Trowbridge, A.M.," (Professor at Waterburgh, Tompkins Co., N. Y.) was received from Professor Kirkwood, of Bloomington, Ind.

Professor Chase made a verbal communication of his views respecting intramercurial bodies revolving around the Sun.

Mr. Briggs described the difficulties in the way of a successful discussion of the type form of the *vena contracta* in hydraulics.

Professor Houston continued the topic, and added remarks upon the nature of the form and movements of the "ventral segments," especially in cases where musical vibrations were employed to effect them.

Pending nominations Nos. 809, 810, 811, 812, were read.

The curators reported, recommending the proposed exchange of duplicates with the Princeton Museum. The report was accepted and adopted.

And the meeting was adjourned.

Stated Meeting, November 17th, 1876.

Present, 17 members.

Vice-President, Mr. FRALEY, in the Chair.

Mr. W. Milnor Roberts, a newly elected member, was introduced to the presiding officer and took his seat.

A letter accepting membership was received from Mr. W. M. Roberts, dated, Bristol, Pa., Nov. 5, 1876.

Letters of acknowledgment were received from the Foundation Teylor, Harlem (95, 97), and the Danish Academy at Copenhagen, Oct. 17 (95).

A letter of envoy was received from the Board of Commissioners of the Second Geological Survey of Pennsylvania, Harrisburg, Nov. 16, 1876.

Donations for the Library were received from the Editors of the Mining Survey of Melbourne; the Academies at Vienna and Copenhagen; the Society at Lausanne; the Revue Politique and London Nature; Mr. Scudder, of Boston; Mr. Packard, of Cambridge; Yale College; Professor E. D. Cope; Editors of the American Chemist; Medical News and Journal of Pharmacy; Franklin Institute; the Geological Survey of Pennsylvania; and the Department of the Interior.

On motion, the bill of Mr. Hall for repairs of the roof was ordered to be paid.

On motion, the Librarian was authorized to exchange the Proceedings for Poggendorff's Beiblätter.

The death of Judge Walter A. Lowrie, at Meadville, Nov. 14th, aged 69, was announced by Mr. E. K. Price.

A communication, entitled "Remarks on the Tonkawa Language" by Mr. Albert S. Gatschet, was presented by Dr. Brinton, with a personal notice of the author, well-known for his work on the geographical nomenclature of Switzerland. He was connected with Von Ruprecht and others on the Wheeler Expedition, and has a book in the Weimar press describing twelve Indian languages of the Southwest. The materials from which he has made the well-written and valuable communication to this Society are all original or unpublished.

Dr. Cresson exhibited a bottle of nauseous smelling well water from near Trenton, N. J., which his analysis showed to contain no animal organic impurities, although a cesspool stood at the distance of two hundred feet; but about one

hundred pounds of vegetable organic impurities (in the million gallons) derived no doubt from a marsh situated higher up the slope of the hill, and about a quarter of a mile off, or from truck farms in the same direction a half mile distant. The drainage seems to break down, through the loam and clay cover, into the rock, and find its way by the bed-plates or cleavage-planes to the well.

Professor Frazer adduced an instance where the water of a well at least forty feet above the level of the Jenny Jump Mountain Great Marsh, in Northern New Jersey, was made poisonous in hot dry seasons especially, by the upward percolation of marsh water.

Dr. Cresson said that in the dryest times the subsoil on the heights of Broad Mountain in Schuylkill Co. Pa. was always kept damp by upward percolation.

Professor Frazer described his observations at a recent visit to the Bamfordville Zinc Works in Lancaster Co. Pa. a mile east of Landisville, superintended by Mr. Spilsbury. The deposit is of great interest to the geologist as well as profit to the owners. Instead of being a carbonate, or silicate, or mixture of these two species of zinc ore, as at Saucon near Bethlehem, and in the Western States, it is a sulphide, a very light yellowish brown zincblende, sometimes quite colorless.

He described the process of treating the ore by crushing; bolting into four or five grades of fineness; jigging, or as to the finest grade buddling; and immediately roasting while wet, fresh from the jig. By using the *wet* material Mr. Spilsbury claims that he desulphurizes more readily. The roasted ore is then retorted with fine anthracite dust, and to the mixture Mr. Spilsbury adds 1 to 1. 5 per cent of salt, claiming to get thereby 5 to 6 per cent more zinc from the ore than he could without the use of the chloride. Professor Frazer was desirous of obtaining the opinions of experts on the two points thus observed.

[*Continued on page* 333.]

density of the solar atmosphere at the surface of the Sun, is but little more than one-half the density of hydrogen at the surface of the Earth, and at a temperature of 60° Fah. The pressure on a square inch of surface, is about 11,000 pounds Avoir. In the case of the Earth the density of the atmosphere at the surface of the Earth, is to the density at the surface of the atmosphere, at least as great 2^{100}: 1. If we assume the same ratio to hold for the Sun's atmosphere, Eq. (23) will give us for the hight of the solar atmosphere, 426,000 miles, or about the radius of the Sun. If we make $t_0 = 0$, we shall find the hight of the atmosphere, with the same ratio of densities, about $12\frac{1}{2}$ miles; the density at the Sun's surface about 740 times that of the Earth's atmosphere at the surface of the Earth, or nearly equal to the mean density of the Sun. It will be noticed that in the case of high temperature, if we assume $K = 10$ (a very improbable value, it being too large), we still have $\triangle = 0.369_0 \triangle_0$, which gives a rare atmosphere. The following table will give the density at different hights above the Sun's surface:

Relative Density.	Hight in Miles.	Absolute Density, or $\triangle_0 = 1$.
$\triangle = 1$	0	0.03699
$\frac{1}{2}$	2536	0.01849
$\frac{1}{4}$	5104	0.00924
$\frac{1}{8}$	7702	0.00462
$\frac{1}{16}$	10330	0.00231
$\frac{1}{32}$	13000	0.00116
$\frac{1}{64}$	15683	0.00058
$\frac{1}{128}$	18403	0.00029
$\frac{1}{256}$	21362	0.00014

These numbers will help us to explain the rapid movements which Prof. C. A. Young and others have noticed in the solar atmosphere. If gases are pent up beneath the solar surface, but finally escape with great force, the rare atmosphere of the sun would not retard the motion like a dense one. The less rapid motion may be due to difference of specific gravity. The density of the hydrogen clouds can be calcnlated from the formulæ which have been given in the text. D. T.

November 24, 1876.

[*Minutes continued from page* 292.]

The minutes of the last meeting of the Board of Officers and Members in Council were read, and the recommendations of the Board were acted upon as follows:

A committee of five, to be appointed by the Chairman, after consultation, was, on motion of Mr. Price, ordered, who should accept Mr. Wooten's invitation, and examine his anthracite slack fires at Reading, or elsewhere along the line of the Reading Railroad.

The curators, on motion of Dr. Cresson, were requested to inquire of the Superintendent of the United States Mint whether it were practicable to arrange for the safe keeping and public exhibition of the cabinet of coins of the Society, in the Mint.

The librarian, was, on motion, authorized to proceed with the printing of the catalogue of the library, beginning with division VI; and directed to report to the Finance committee the plan and cost of the work. The Librarian explained that division VI, VII, and VIII, would make a volume nearly as large as that of division I to V, already published; and that division VI (Sociology, Commerce, Manufactures, War and Law) is ready to go to press, every title having been verified by reference to book or pamphlet. The other divisions (VII, Language, Belle Lettres, Fine Arts, Ethics, Metaphysics, Philanthropy and Religion; and VIII, Biography and Newspapers) will be ready for the press by the time division VI is printed. The press work must attend on a careful proof reading, and be therefore slow. The whole cannot be finished in less than eighteen months.

Pending nominations 809, 810, 811, 812 were read.

The name of Dr. James Gibbons Hunt was ordered to be taken from the roll of members, at his request.

Judge I. I. Hare's resignation on account of his inability to attend any meeting of the Society, was accepted.

Mr. Fraley reported the receipt of the quarterly interest of the Michaux Legacy, due Oct. 1st ult., $145.45, and its payment to the Treasurer.

Mr. Price offered the following resolution, which was discussed and passed:

Resolved, That this Society consents that, after providing for the Michaux grove of oaks, and for cultivation of other oaks in the park nursery, as provided by the resolutions of the Fairmount Park commissioners of March 12 (17?)th, 1870, and agreed to by the society on the 18th of March, 1870, the residue of the income of the Michaux legacy paid over to the Park commission may be applied to the pur-

purchase of other trees; and such other trees as well as oaks may be distributed not only to other parks, but to city squares, and in exchange with other public nurseries, and towards planting the grounds of institutions of learning and charity, to any extent that will not impair the primary purpose of said agreement of March, 1870.

And the meeting was adjourned.

Stated Meeting, Dec. 1st, 1876.

Present, 13 members.

Mr. ELI K. PRICE, in the Chair.

Letters of acknowledgment were received from the Societies at Göttingen July 15, (Proc. Vol. XIV) and Emden (94), and the Smithsonian Institution, July 22d (97).

A letter of envoy was received from the Society at Emden.

Donations for the Library were reported from the Academies and Societies at St. Petersburg, Berlin, Moscow, Emden, St. Gallen, Cherbourg, and Rotterdam; the Revue Politique, and London Nature; the Royal Astronomical, Geographical and Zoölogical Societies; the Museums at Cambridge, and Albany; New York State Library; Poughkeepsie Society of Natural Science; Professor E. D. Cope; and the Brazilian Centennial Commissioners.

On the report of the curator present of an interview with the superintendent of the mint, it was resolved that the report be adopted and the curators be requested to take such further measures as may be necessary for the placing of the Society's collection of coins under the care of the officers of the United States Mint.

Professor Hart read a paper entitled, "The Fairy Folk, or Fairy Lore of Spencer and Shakespeare," giving the romance or latin origin of the words fairy, &c., in contrast with the teutonic origin of the words elf, &c., assigning different characters to this species of imaginary creatures, supporting the distinction by numerous quotations, and the recital